

Themadag “Seabirds at sea in the North Sea”

Op zaterdag 8 oktober 1994 organiseerde de NOU in samenwerking met de *European Seabirds at Sea Co-ordinating Group* (ESAS) een themadag over zeevogels in de Noordzee. Gastvrijheid werd verleend door het Nederlands Instituut voor Onderzoek der Zee (NIOZ) op Texel. De bijeenkomst werd voorgezeten door W. J. Wolff en de samenvattingen werden verzorgd door C. J. Camphuysen.

The European Seabirds at Sea Database: history and aims

MARK TASKER

Studies of seabirds at sea off Europe began as long ago as the 1920s. These studies, and most of those until the 1970s, were essentially academic in nature, focusing on migration patterns and how seabirds related to their marine environment. The discovery of oil in the North Sea prompted concerns that seabirds would be placed at risk, and led to demands to find which areas of the North Sea were most important for seabirds and when. The UK established its Seabirds at Sea Team (SAST) in 1979, largely to meet these demands. It was (and still is) funded by a consortium of oil industry and government. SAST started by surveying the northern North Sea, and has gone on to carry out surveys in virtually all UK waters and many adjacent areas. An early step was the establishment of standard methods of counting birds at sea that gave an acceptable estimate of birds per unit area that was comparatively free of major sources of bias (Tasker *et al.* 1984).

Seabirds are however wide ranging animals, and can move considerable distances in short periods of time. If we are to understand their movements, both for pure biological reasons and for conservation purposes, they need to be studied over their full range. Fortunately, partly as a result of the efforts of SAST, several further projects commenced in European waters based in states bordering both the North and Baltic Seas. Most of these projects used survey methods the same as, or compatible with the standard developed by SAST. In 1991, as part of the North Sea ministerial process, funding was received from the UK government to bring together data sets from off north-western Europe. This project established common standards for combining the data and brought together over one million records, concerning some 13 million seabirds from waters off north-western Europe. The project also devised and agreed methods for assessing the vulnerability of offshore seabird concentrations to oil pollution (Williams *et al.* in press) and produced an atlas of seabird vulnerability to oil pollution in the North Sea (Carter *et al.* 1993). Further atlases of bird distribution and vulnerability are nearing completion (e.g. Stone *et al.* in prep., Camphuysen & Leopold 1994). Cetaceans were also recorded during most seabird surveys, and analyses of these records have en-

abled the first effort-related maps of distribution of these animals to be made.

The database is now available as a valuable source of information for research. It has been used, for example, as part of a study into seabirds feeding on fishery waste in the North Sea (Camphuysen *et al.* 1993) and to compare seabird distribution with those of fish stocks (Jensen *et al.* 1994). There are many plans for further analyses. The European Seabirds at Sea co-ordinating group meets regularly to discuss co-operative work and analyses. The database has been regularly updated, and its area of coverage expanded to include waters from 43°N to 62°N and from 16°W to 14°E. It is hoped to include information from the Baltic in future. The eventual aim of the co-ordinating group is to have as comprehensive a dataset as possible on the distribution of European Seabirds at sea available for use by all interested people. While conservation objectives remain of primary importance, we hope that other scientific disciplines will make use of the information.

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Kittiwakes *Rissa tridactyla* in the North Sea: pelagic ecology, fisheries relationships and feeding strategies

KEES CAMPHUYSEN

The possibilities and limitations of the ESAS Database are examined using the information on Kittiwakes as an example. Ship-based surveys were originally initiated to answer basic questions such as "how are seabirds at sea distributed", mainly to assess the risk for birds with respect to oil spills. Follow-up questions, such as "why are seabirds where they are", have been treated only briefly, because answering such questions requires a rather different approach. The Kittiwake is a truly pelagic species which nests on cliffs mainly in the northwestern half of the North Sea and normally does not feed on land. The diet of Kittiwakes in the North Sea is mainly studied in the breeding season and comprised mostly of fish. In other areas, Kittiwakes are known as plankton feeders. Massive wrecks of starved Kittiwakes have occurred in the 1980s in the North Sea, which could only be explained as being the result of a shortage of food.

Kittiwakes occurred highly concentrated near colonies in the breeding season, but were widespread the rest of the year. Wintering Kittiwakes are generally assumed to be attracted by commercial fisheries, although some studies indicate that discards are of limited importance. Recent studies showed that feeding success of Kittiwakes at trawlers varied, but that Kittiwakes are specialized scavengers, feeding on smaller discards than most other species. Of all species at the trawl, Kittiwakes suffered most from kleptoparasitism, which excluded them from this source of food in waters rich in e.g. Fulmars and Gannets. Large numbers of Kittiwakes have been found associated with trawlers, particularly in winter, but most Kittiwakes feed 'naturally'.

Distribution patterns, as produced for Kittiwakes by summing up data over a number of years of different effort, are not easy to interpret. Distribution maps from ESAS Database are in fact composites of several years of data. Yet, Kittiwakes may occur in short-lived patches in very large numbers, leaving vast areas of water 'empty'. Patches of high densities encountered in year A feature on composite maps for many years. Some patches off the British east coast, as found in North Sea wide surveys in May and August 1994 are shown. A high density area found off Aberdeen is studied in more detail and appeared to be very rich in a number of seabirds. Fulmars occurred widespread, but not beyond the patch where very high densities of auks and Kittiwakes occurred. Hydrographical data collected on fishing stations around the high density area indicated that waters were stratified on the sea side and mixed on the land side of the area. A frontal boundary was found in the area with very large concentrations of seabirds. This front is known from literature and seems to provide good feeding conditions for a number of seabirds. Yet, it is not known what the birds were feeding on, only that very substantial numbers of seabirds use such areas and that some species co-occur while others are absent. Small scale studies of seabird distribution coupled with diet studies are recommended for a better understanding of distribution patterns and of possible causes underlying wrecks.

Seabird distribution in relation to sea depth

CAROLYN STONE

The density of seabirds in relation to sea depth in northwest European waters is examined. Fourteen years of data from ship-based surveys in the area 48°N - 63°N and 15°W - 14°E have been analysed. Many species, including divers, seaduck, terns, Shags and Cormorants are shown to inhabit shallow waters mostly of less than 50 m depth. Some interspecific differences in the relationship between depth and seabird density are shown to be due to geographical differences in distribution e.g. between Cormorants and Shags, and between Arctic Terns and Common Terns. Some species of gull are also found to inhabit shallow waters, particularly those species which commonly feed on land. The distribution of auks extends over continental shelf waters, with the exception of Black Guillemot, which remains in shallow coastal waters. There are slight interspecific differences between Guillemots, Razorbills and Puffins, extending to waters over the shelf edge and deep sea in low densities in summer. Manx Shearwaters, in spite of their ability to fly long distances, are found mostly over the continental shelf; those found far from land are gathered over shallow offshore banks. The outer shelf and shelf edge is important for species scavenging at fishing vessels e.g. Lesser and Great Black-backed Gulls and Great Skuas. However, depth seems to have a stronger influence on the distribution of Fulmars, Kittiwakes, Gannets and Storm Petrels than the presence or absence of fishing vessels. These species are found in moderately high densities in deep waters where fishing intensity is low. Most species do not change their distribution in relation to depth throughout the year, exceptions being Gannets, Kittiwakes, Herring Gulls and Great Black-backed Gulls, which move to deeper waters during the winter months.

Factors influencing the relationship of seabird density with depth are considered. Diving depth is thought to be important for surface-diving species feeding on prey at or near the seabed. Distance from land is likely to be important during the breeding season, although there is some evidence that this factor alone does not account for the observed relationship between depth and seabird density. Distribution of prey and, for those species feeding behind trawlers, location of fishing vessels, were also considered to be important. Water temperature is unlikely to account for the relationship. The location of fronts which occur at characteristic depths, particularly between mixed and stratified water, could also contribute to the relationship between depth and seabird density.

The distribution of Fulmars *Fulmarus glacialis* in the German Bight: do fisheries or hydrography explain the pattern?

STEFAN GARTHE & OMMO HÜPPOP

Pelagic seabirds occur in small numbers in the southeastern North Sea although some species breed on Helgoland. Nevertheless, the German Bight is an important area for fisheries and is characterized by a very complex hydrographical situation. Hence, it is well suited for studying the relationships between seabirds, fisheries and

hydrography. One of the most obvious examples is the Fulmar which will be presented here. Marked differences were found in the distribution patterns of July 1993 and July 1994. In July 1993, no clear picture could be obtained although the species were absent from areas close to the coast. On the other hand, in July 1994, Fulmars were nearly absent from large parts of the German Bight. However, they occurred in rather high densities to the northwest of the study area. During two transects at the border of the distribution area, simultaneous counts of birds on both sides of the research vessel "Heincke" (Biologische Anstalt Helgoland) and hydrographical measurements (CTD-profiles every 3 to 4 nautical miles) were conducted in July 1994. In both cases Fulmar distribution was limited to thermally stratified water with relatively high salinity (32 and 32.5 upwards, respectively). Also, the overall density of this species in the German Bight was much higher for salinity intervals of 33 to 34 compared to those of 31 to 32 and 32 to 33. There were no major differences in the distribution of fishing fleets and hence the availability of fishery waste (offal, discards) which could explain the distinct distribution patterns of the Fulmar. The same holds for the number of ship-followers which show no significant correlation to scavenging competitors like large gulls. On the other hand, the number of Fulmars at the stern of fishing vessels was higher for higher salinity values. Hence, hydrography, above all salinity, can explain the Fulmars' distribution best. The link of certain salinity values to the food of Fulmars has to be established better, but fishery waste appears to be a rather supplementary diet.

Associations between the distribution of Fulmars *Fulmarus glacialis*, Little Auks *Alle alle* and surface hydrography in the North Sea

HENRIK SKOV & JAN DURINCK

This paper presents results of analyses of associations between average large scale patterns of Fulmar, Little Auk and surface hydrography recorded in the North Sea during the period after 1980. Chi-square statistics were used as a basis for testing the birds' use of different watermasses. The null hypothesis that distributions were independent of watermasses was rejected. Two models derived from studies in the continental zone of the North Sea were tested which might further describe the relationship between the watermasses and bird distributions in the whole area. The first model predicts an avoidance pattern in relation to low saline surface water masses. This model also predicts a preference for the most saline waters. The prediction of avoidance of neritic waters holds for the entire North Sea as both species strongly avoided the most brackish surface waters of the inner German Bight and the Kattegat-Baltic Sea. Little Auk showed significantly less use of surface waters with salinities below 32‰ salinity as well as areas characterized by a mixed water column. Fulmar avoided surface water masses below 25‰ in summer, below 30‰ in spring and autumn and below 32‰ in winter. Yet, the prediction of more intensive use of the more saline surface waters did not seem to be applicable for the entire North Sea. An important exception was the concentration of Fulmar recorded in surface

waters above 35‰ around Shetland during all four seasons.

The second model describes preferences for zones exhibiting strong horizontal property gradients with lower use of areas with salinity changes over long distances. This model was successfully applied to the occurrence of Little Auk in the whole area and Fulmar observed outside the Shetland region. Little Auk concentrated in waters with a change in surface salinity of 30-34‰ across the narrow zone along the southern and western edges of the Norwegian Trench. Fulmar changed preferences of watermasses over the year. As the Little Auk it showed significantly higher use than expected of waters with a surface water gradient of 30-34‰ along the southern and western edges of the Norwegian Trench in summer and autumn. Yet, during winter this preference for a relatively small part of the North Sea broke down and Fulmar made heavy use of all areas with surface salinities above 32‰. In spring, Fulmar distribution was centered around Shetland.

Environmental determinants of the distribution of small cetaceans in the waters of North-west Europe

NORMAN RATCLIFFE

Sightings of Harbour Porpoises, White-beaked Dolphins and Common Dolphins were recorded in front of ships by dedicated observers between 1979 and 1993. Sightings were divided by the number of km travelled to provide an index of relative abundance. The effects of sea state on detectability were controlled by using a correction factor for each species. These data were related to three oceanographic factors derived from a principle components analysis of oceanographic variables. The cetacean species studied demonstrated significant degrees of habitat selection within the study area. Harbour Porpoises increased significantly in shallow, neritic waters and also demonstrated significant selection towards cool northerly waters. White-beaked Dolphin distribution was determined primarily by sea-surface temperature, preferring the cool waters in the north of the region, though they also showed weak selection towards shallow inshore habitats. Common Dolphins showed significant selection towards the warm saline waters of the North Atlantic Drift in the south west of the region, but showed no selection along the depth-distance gradient. Since there are strong effects of these factors on cetacean distribution, it should be possible to use these factors to predict occurrence in areas which have not been surveyed. Classification tables were constructed using a jack-knife procedure to test the ability of the model to predict the occurrence of cetaceans in each degree square which had been surveyed. This test of the model demonstrated that the model was a poor predictor of occurrence for all three species studied, having a tendency to classify cetaceans as absent in squares where they were in fact present. This suggests that although the logistic regression procedure was effective in determining coarse trends in cetacean occurrence and the general location of concentrations, the scale of the analysis was too fine to allow the prediction of their exact geographical positions.

Auk distribution in relation to colony location around Britain and Ireland

ANDY WEBB, CAROLYN STONE & MARK TASKER

Auks are marine seabird species which come to land to visit and use colonial sites, mainly in spring and summer. Auks have been the subject of many detailed studies of their breeding biology while on land; some of these studies have attempted to assess the distances auks travel to feed. Studies of auk feeding distribution around their colonies are few. Detailed investigations have taken place around six breeding sites in the United Kingdom and one in Germany. This paper presents the results of an investigation of the distribution of Guillemot *Uria aalge*, Razorbills *Alca torda* and Puffin *Fratercula arctica*, primarily around colonies in the United Kingdom but will also cover colonies in The Channel and the eastern North Sea. The positions of each ten-minute sample held in the European Seabirds at Sea database were related to the position of the nearest colony in the study area for that species. The information on the location of colonies were derived mainly from the Seabird Group/ Joint Nature Conservation Committee Seabird Colony Register. Distances between two points were measured using trigonometric methods. It was assumed that auks did not fly over land to reach their colony, thus the method took account of this when measuring distances between points at sea and in calculating which colony was nearest.

Guillemots, Razorbills and Puffins were recorded at distances of up to 350 km from the nearest colony. In June, during the main chick-rearing period for all three auks, the majority of sightings were from much closer to the colony. In the North Sea and around Ireland and South and West Britain, median distances of Guillemots were further from the nearest colony than for Razorbills and Puffins (although colonies are of minimal size in the eastern North Sea for the latter two species). The European Seabirds at Sea database provides information which can be used to estimate the foraging ranges of auks from their colonies. However, these estimates are minima but suggest that during the breeding season, breeding auks feed closer to their colonies than non-breeding birds. Estimates of foraging ranges around colonies can be used to assess the range of vulnerability of auks to anthropogenic threats.

The distribution and numbers of Red-throated Divers *Gavia stellata* and Black-throated Divers *Gavia arctica* in the North Sea in relation to habitat characteristics

MARDIK LEOPOLD, HENRIK SKOV, JAN DURINCK

In the pre-ESAS era two (British) atlases of birds in the North Sea were published. These generated a lot of interest and other teams joined the task of mapping the marine avifauna because it was realised that large gaps in coverage still existed at that time. Particularly inshore waters, with a specific species assemblage of gulls, seaduck and divers were poorly covered. Estimates of numbers of these birds could not reliably be made, and important (wintering) areas could not be pinpointed. Knowledge from other sources, e.g. seawatching, sug-

gested that the inner German and Southern Bights, or the coastal strip along the Wadden Sea and mainland Netherlands and Belgium should be an area with large numbers of divers and seaduck in particular. With this in mind, this area became the subject of extensive, dedicated surveys in the late 1980s and 1990s. Equally important, criteria for incorporating marine habitats in a network of protected areas needed to be developed. 'Ramsar' sites were already well-known in land-linked wetlands, but the notion that 'Special Areas' could also be established away from land was new. The study area mentioned provided a well-defined habitat, that was likely to hold internationally important numbers of vulnerable birds, while it was intensively used by man for fishing and traffic. The area is easily distinguished by its water type. The salinity is relatively low, as a result of the input from several large rivers. The shallow depth, input of rivers and the interaction with the Wadden Sea result in a high turbidity and low water clarity. On clear days, this watermass can be made visible by infrared photography from satellites. The border ('coastal front') can also be visible for seabirds (observers) at the surface during calm days. How the poor underwater visibility influences the foraging of piscivorous seabirds like divers is unclear. However, our surveys that focussed on finding divers in this hitherto poorly known area clearly showed that within the North Sea, this is the prime area for wintering Red-throated Divers. Black-throated Diver numbers peak in spring, when birds fly to the northern German Bight to moult off the coasts of Schleswig-Holstein and Jutland. An estimated total number of 42 740 divers winter in the southeastern North Sea. Most are Red-throated Divers, with the proportion of Black-throated Divers decreasing from some 25% in the north to around 1% in the south. As the known wintering population in NW-Europe is around 110 000 birds, the study area is of obvious importance. The only other area of comparable significance is the Baltic Sea, where 50-60 000 birds are estimated to winter. The data gathered during the surveys in the southeastern North Sea have been appended to the ESAS-database. In terms of diver distribution, this has greatly improved our perception of important areas in the North Sea. Some intriguing areas still remain poorly surveyed: around Britain, but particularly along the Atlantic seaboard of France and Spain.

Seabird concentrations in the shallow parts of the Baltic Sea

HENRIK SKOV & JAN DURINCK

In 1991 it was decided to launch a study of the wintering seabirds in the still unsurveyed parts of the Baltic. On the basis of this and earlier studies, the bird populations were to be estimated and important areas pointed out. For the purpose of this study we defined the northwestern border of the Baltic Sea to the Skagerrak, following the boundaries established in the Helsingfors Convention (Helcom). The Swedish, West German and Danish parts of the Baltic Sea had received attention from waterfowl researchers in the past 20 years, but the areas within the former Soviet Block were still 'white spots' on the seabird map. About 20 000 km were surveyed by ship and 10 000 km by using an aircraft, with the main effort concentrated in the winters of 1992 and 1993. The

total number of seabirds wintering in the southern Baltic Sea was estimated at 9.19 million; about twice the number previously thought to occur in the region. For several species more than 10% of the Northwest European population was estimated to winter in the region. An estimated 57 000 divers *Gavia arctica/stellata*, 146 000 Greater Scaup *Aythya marila*, 1 million Common Eider *Somateria mollissima*, 4.2 million Long-tailed Duck *Clangula hyemalis*, 783 000 Black Scoter *Melanitta nigra* and 932 000 Velvet Scoter *Melanitta fusca* were among the birds found within the area. These results suggest that this region is of great importance to wintering seabirds in Northwest Europe. A total of 39 areas with more than 1% of a single species' total population wintering in Northwest Europe were found, the best having a sum of proportions of 158%. The concentrations of importance to the total populations were mainly found in areas shallower than 30 m and in the Baltic such areas extend far into the offshore zone.

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In memoriam Hendrik Frederik van der Lee (1921-95)

Op 18 april 1995 overleed in het Ikazia Ziekenhuis te Rotterdam Hendrik Frederik van der Lee, huisarts in rust te Numansdorp, oud voorzitter en erelid van de Club van Nederlandse Vogelkundigen en belangrijk Nederlands vogelwaarnemer.

Henk van der Lee werd op 6 november 1921 geboren te Amsterdam, waar hij zijn jeugd in de toen nog betrekkelijk landelijke Watergraafsmeer doorbracht. In 1934, toen mijn ouders ook in Watergraafsmeer waren komen wonen, werden wij schoolkameraden op de Derde Vijfjarige Hogere Burgerschool aan de Mauritskade in Amsterdam en sindsdien zijn wij vrienden voor het leven gebleven en gelukkig niet slechts uitsluitend op het gebied van de vogels. Van der Lee schreef daarover zelf uitvoerig in het bij gelegenheid van mijn zeventigste verjaardag verschenen bijzondere nummer van *Het Vogeljaar* (38 (1990): 100-102). Wij werden leden van de Nederlandse Jeugdbond voor Natuurstudie (NIN) resp. in 1934 en 1935, van de Nederlandse Vereniging tot Bescherming van Vogels in 1935 en van het Centraal Bureau voor Vogelstudie van de Nederlandse Natuurhistorische Vereniging, afdeling Amsterdam in 1937.

Gedurende de HBS-tijd waren wij op vogelexcursies in en rondom Amsterdam onafscheidelijk en wij hebben

in alle opzichten veel van elkaar geleerd. Hoogtepunten waren regelmatige bezoeken aan de baggerstortplaats "De Roothoek" aan het Noordzeekanaal bij zijkanaal H en aan de vogelrijke Nieuwe Oosterbegraafplaats (broedende Torenvalk, Boomvalk, Steenuil, Ransuil), de trekwaarnemingen aan de IJsselmeerkust bij Zeeburg voor W. H. van Dobben en G. F. Makkink in 1935-37, de broedende Stelfklutten bij Oostzaan in 1935 en later ook de broedende Krooneenden en Witoogenden in de Botshol, samen met A. A. (Ton) Hinloopen (*Amoeba* 21 (1942): 76-77).

Na de inspirerende schooljaren, waarin reeds Van der Lee's talenten als tekenaar en zanger opvielen, volgde in 1938 de studie natuurkunde aan de Gemeentelijke Universiteit van Amsterdam, onderbroken door de Tweede Wereldoorlog en een lange zeereis als "natuurvorser" en vogelverzamelaar aan boord van de Nederlandse walvisvaarder "Willem Barendsz" (1946-47), die destijds grote nationale publiciteit en belangstelling trok. In het zuidelijke vanggebied was hij meestal op een van de kleine *catchers* te vinden. De internationale zakenman en late-re voorzitter van de Club van Nederlandse Vogelkundigen, J. G. van Marle en zijn vriend Karel H. Voous van het Zoölogisch Museum van de Universiteit van Amsterdam hadden voor deze onderneming de toestemming van de rederij Vinke & Co te Amsterdam weten te krijgen. Van de door Van der Lee bijeengebrachte vogelcollectie en de verdere ornithologische ervaringen van de scheepsarts en voortreffelijke vogelwaarnemer